

CLAIMS

1. A surface acoustic wave filter comprising:

a first dielectric layer having a first ground on its lower face and a
5 plurality of transmission lines on its upper face;

a second dielectric layer provided at the upper face of the first
dielectric layer and having a second ground on its upper face;

a surface acoustic wave element provided at the upper face of the
second dielectric layer; and

10 a cavity provided at the upper face of the second dielectric layer and
surrounding the surface acoustic wave element,

wherein:

one end of the plurality of transmission lines is connected to the
surface acoustic wave element and the other end thereof is connected to the
15 first or second ground;

the surface acoustic wave filter has an additional transmission line
between two neighboring transmission lines among the plurality of
transmission lines; and

the additional transmission line is connected to the first or second
20 ground at an interval equal to or lower than a wavelength of a using
frequency.

2. A surface acoustic wave filter according to claim 1 wherein the surface
acoustic wave element has at the surface thereof an input terminal, a
25 connection terminal, at least two serial connected resonators and at least two
parallel connected resonators.

3. A surface acoustic wave filter according to claim 1 further comprising one
or more dielectric layers having the transmission line.

4. A surface acoustic wave filter according to claim 1 further comprising a metal plate for covering the cavity.

5 5. A surface acoustic wave filter according to claim 1 further comprising a connection via hole having therein a conductor, wherein the connection via hole connects the first ground to the second ground.

6. A surface acoustic wave filter according to claim 5 wherein the
10 connection via hole is connected to the transmission line, and the connection via hole has a diameter smaller than a line width of the transmission line to be connected thereto.

7. A surface acoustic wave filter according to claim 1 wherein the additional
15 transmission line has at least one branch.

8. A surface acoustic wave filter according to claim 1 wherein the additional transmission line has at least one corner section.

20 9. A surface acoustic wave filter according to claim 8 wherein a corner of the corner section has an angle of 45° or 90°.

10. A surface acoustic wave filter according to claim 8 wherein the additional transmission line at the corner section is connected via a connection via hole
25 to the first or second ground.

11. A surface acoustic wave filter according to claim 1 further comprising:
a transmission terminal, a reception terminal, and an antenna
terminal at the lower face of the first dielectric;

one transmission line of the transmission lines connected to the transmission terminal;

another transmission line of the transmission lines connected to the reception terminal;

5 and still another transmission line of the transmission lines connected to the antenna terminal,

wherein the additional transmission line is disposed between any two neighboring transmission lines among the three transmission lines.

10 12. A surface acoustic wave filter according to claim 1 wherein at least one of a pass band and an attenuation band is 60MHz or more.

13. A surface acoustic wave filter according to claim 1 wherein the additional transmission line suppresses an electric field coupling between the two
15 neighboring transmission lines.

14. A surface acoustic wave filter comprising:

a surface acoustic wave element;

a transmission terminal;

20 a reception terminal;

an antenna terminal; and

a dielectric layer, the dielectric layer including:

a first transmission line for connecting the transmission terminal to the surface acoustic wave element;

25 a second transmission line for connecting the reception terminal to the surface acoustic wave element; and

a third transmission line for connecting the antenna terminal to the surface acoustic wave element, wherein:

the dielectric layer further includes an additional transmission

line between two neighboring transmission lines among the first, second, and third transmission lines, and

- the additional transmission line is connected to a ground at an interval equal to or lower than the wavelength of a using frequency to
- 5 suppress an electric field coupling between the two neighboring transmission lines.